

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicants : H. MURAKAMI et al.  
 Serial No. : 10/517,502  
 Filed : December 10, 2004  
 For : STEEL SHEET FOR VITREOUS ENAMELING AND  
 PRODUCTION METHOD  
 Examiner : Yee, Deborah  
 Art Unit : 1793  
 Confirmation No. : 1252

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Signature: /Katy Chan-Parsons/  
 Katy Chan-Parsons

**APPEAL BRIEF PURSUANT TO 37 C.F.R. § 41.37**

On March 2, 2010, Appellants submitted a Notice of Appeal from the last decision of the Examiner contained in the Final Office Action, dated September 3, 2009, in the above-identified application. The Notice of Appeal was electronically filed, and is believed to have been received by the United States Patent and Trademark Office on March 2, 2010.

In accordance with 37 C.F.R. §41.37, this Appeal Brief is submitted in support of the appeal of the final rejection of claims 10 and 11. For at least the reasons set forth below, the final rejection of claims 10 and 11 should be reversed.

**1. REAL PARTY IN INTEREST**

The real party in interest in this appeal is Nippon Steel Corporation, the Assignee of the entire right, title, and interest in and to the present invention.

## **2. RELATED APPEALS AND INTERFERENCES**

There are no other prior or pending appeals, interferences, or judicial proceedings known by the undersigned, or believed by the undersigned to be known to Appellants or the Assignee, Nippon Steel Corporation, “which may be related to, directly affect or be directly affected by or have a bearing on the Board’s decision in the pending appeal.”

## **3. STATUS OF CLAIMS**

Claims 1 to 6 have been cancelled.

Claims 7 to 9 have been withdrawn from consideration, as being drawn to a non-elected invention.

Claims 10 and 11 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over Japanese Patent No. 2002-80934 (JP ‘934) in view of the English abstract of JP360100686 (JP ‘686) or the English abstract of JP73029289 (JP ‘289); and

Claims 10 and 11 stand rejected on the ground of obviousness type double patenting over claims 1 to 3 of U.S. Patent No. 6,808,678 to Murakami et al. (Murakami).

## **4. STATUS OF THE AMENDMENTS**

In response to the Office Action, dated September 15, 2008, Appellants submitted an RCE Amendment on August 11, 2009, following the filing of a Notice of Appeal on March 12, 2009. The Amendment included the cancelation of claims 1 to 6 and the addition of new claims 10 and 11. The Office Action dated September 3, 2009, states that that Office Action is responsive to the RCE Amendment, which was received by the PTO on August 14, 2009. As such, it is Appellants understanding that the August 11, 2009, Amendment has been entered.

Following a telephone conference with the Examiner, an Amendment under 37 C.F.R. 41.33 was filed on May 21, 2010, to put the claims in better form for consideration on appeal. The claims, as included in the annexed “Claims Index,” reflect the entry of that Amendment.

## **5. SUMMARY OF CLAIMED SUBJECT MATTER**

The claims on appeal include one (1) independent claim, i.e., claim 10.

Independent claim 10 relates to a steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties. *Specification*, page 1, lines 8 to 11, and page 15, lines 15 to 17. The presently claimed steel sheet comprises:

No more than 0.0025 mass percent carbon, *specification*, page 5, lines 35 and 36;

No more than 0.010 mass percent silicon, *specification*, page 6, lines 10 and 11;

From 0.1 to 0.5 mass percent manganese, *specification*, page 6, lines 17 to 21;

0.0005 to 0.0033 mass percent nitrogen, *specification*, page 7, lines 20 to 22;

From 0.60 times the amount of nitrogen to 0.0060 mass percent boron, *specification*, page 7, lines 29 to 32;

From 10 times the difference between the amount of boron and  $11/14$  times the amount of nitrogen,  $10 \times (B - 11/14 \times N)$ , to 0.030 mass percent phosphorous, *specification*, page 6, lines 32 and 33;

No more than 0.030 mass percent sulfur, *specification*, page 6, lines 35 and 36;

No more than 0.010 mass percent aluminum, *specification*, page 7, lines 6 and 7;

0.005 to 0.0450 mass percent oxygen, *specification*, page 8, lines 6 and 7; and

A balance of Fe and unavoidable impurities, *specification*, page 2, line 26, to page 3, line 26, and original claims 1, 2, and 3.

The steel sheet contains simple or compound nitrides, having a diameter of 0.02 to 0.50  $\mu\text{m}$ , containing boron or aluminum, and having an average diameter of at least 0.080  $\mu\text{m}$ . *Specification*, page 8, line 33, to page 9, line 2. The proportion of the number of the nitrides of 0.050  $\mu\text{m}$  or smaller in diameter to the total number of the nitrides is 10 percent or less. *Specification*, page 9, lines 2 to 4. The ratio of the amount of nitrogen in the steel sheet existing as boron nitride, BN, to the amount of nitrogen in the steel sheet existing as aluminum nitride AlN,  $(\text{the amount of N existing as BN})/(\text{the amount of N existing as AlN})$ , is  $\geq 10.0$ . *Specification*, page 8, lines 12 and 13. The steel sheet comprises nickel plating on the steel sheet in an amount of about 0.01 to 2  $\text{g/m}^2$ . *Specification*, page 15, lines 15 to 17.

Claim 11, which depends from claim 1, relates to the steel sheet for vitreous enameling according to claim 10, wherein the steel sheet further comprises one or more of niobium, vanadium, titanium, nickel, chromium, selenium, arsenic, tantalum, tungsten, molybdenum, and tin, each in an amount of no more than 0.030 mass percent. *Specification*, page 3, lines 28 to 33.

## **6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Whether claims 10 and 11 are patentable under 35 U.S.C. § 103(a) over Japanese Patent No. 2002-80934 (JP '934) in view of the English abstract of JP360100686 (JP '686) or the English abstract of JP73029289 (JP '289); and

Whether claims 10 and 11 are patentably distinct from claims 1 to 3 of U.S. Patent No. 6,808,678 to Murakami et al. (Murakami). Appellants submit that Murakami issued from the U.S. national stage filing of the PCT application corresponding to JP '934, and the specification of Murakami is a translation of JP '934.

## 7. ARGUMENT

Claims 10 and 11 stand rejected on the ground of obviousness type double patenting over claims 1 to 3 of U.S. Patent No. 6,808,678 to Murakami et al. (Murakami); and

Claims 10 and 11 stand rejected under 35 U.S.C. § 103(a), as allegedly being unpatentable over Japanese Patent No. in view of the English abstract of JP360100686 (JP '686) or the English abstract of JP73029289 (JP '289), for the reasons set forth on pages 4 and 5 of the Office Action, dated September 3, 2009.

Appellants submit that the presently claimed invention is directed to a steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties. The presently claimed steel sheet comprises no more than 0.0025 mass percent carbon, no more than 0.010 mass percent silicon, from 0.1 to 0.5 mass percent manganese, 0.0005 to 0.0033 mass percent nitrogen, from 0.60 times the amount of nitrogen to 0.0060 mass percent boron, from 10 times the difference between the amount of boron and 11/14 times the amount of nitrogen,  $10 \times (B - 11/14 \times N)$ , to 0.030 mass percent phosphorous, no more than 0.030 mass percent sulfur, no more than 0.010 mass percent aluminum, 0.005 to 0.0450 mass percent oxygen, and a balance of Fe and unavoidable impurities.

The steel sheet contains simple or compound nitrides, having a diameter of 0.02 to 0.50  $\mu\text{m}$ , containing boron or aluminum, and having an average diameter of at least 0.080  $\mu\text{m}$ ;

The proportion of the number of the nitrides of 0.050  $\mu\text{m}$  or smaller in diameter to the total number of the nitrides is 10 percent or less;

The ratio of the amount of nitrogen in the steel sheet existing as boron nitride, BN, to the amount of nitrogen in the steel sheet existing as aluminum nitride AlN, i.e.,

$$\frac{(\text{the amount of N existing as BN})}{(\text{the amount of N existing as AlN})},$$
is  $\geq 10.0$ ; and

The steel sheet comprises nickel plating on the steel sheet in an amount of about 0.01 to 2  $\text{g/m}^2$ .

Appellants submit that it is well settled law that, for a *prima facie* case of obviousness under 35 U.S.C. § 103(a), there must be a reason to combine and/or modify the teachings of the cited prior art references to obtain the claimed invention, there must be a reasonable expectation of success without resort to hindsight, and the prior art references, when combined, must teach or suggest all the claim limitations.

Thus, for the present claims to be obvious over the cited prior art, the cited references must at least teach or suggest all the limitations of the present claims. For the reasons set forth below, the cited references fail to teach or suggest all the limitations of the present claims. Thus, even if the prior art discloses steel plate compositions comprising the metals and other elements recited in the present claims in the recited ranges, the present claims are not obvious, as the prior art does not disclose or suggest a steel plate containing in combination:

Simple or compound nitrides, containing boron or aluminum, having a diameters in the range of 0.02 to 0.50  $\mu\text{m}$  and an average diameter of at least 0.080  $\mu\text{m}$ ; where

Ten (10) percent or less of the total number of nitrides have a diameter of 0.050  $\mu\text{m}$  or smaller; and

The ratio of the amount of nitrogen in the steel sheet existing as boron nitride, BN, to the amount of nitrogen in the steel sheet existing as aluminum nitride AlN is at least 10.0, i.e.,  
$$\frac{\text{(the amount of N existing as BN)}}{\text{(the amount of N existing as AlN)}} \geq 10.0.$$

In this regard, at pages 4 and 5, the Office Action states:

JP '934 teaches controlling the size distribution of BN for improving the anti-aging property and the anti-seed and anti-black-speck properties such that the average diameter of precipitates of BN alone and BN-containing composite precipitates having a diameter of not less than 0.005  $\mu\text{m}$  and not more than 0.5  $\mu\text{m}$  is limited to not less than 0.010  $\mu\text{m}$  and the proportion of the number of precipitates having a diameter of not more than 0.010  $\mu\text{m}$  in the number of precipitates of BN alone or BN-containing composite precipitates having a diameter of not less than 0.005  $\mu\text{m}$  and not more than 0.5  $\mu\text{m}$  is limited to not more than 10%. Similarly present invention teaches controlling nitride limitation wherein "simple or compound nitrides having a diameter of 0.02 to 0.50  $\mu\text{m}$  which contain B or Al, and having the average diameter of 0.08  $\mu\text{m}$  or larger, and the proportion of the number of the nitrides of 0.050  $\mu\text{m}$  or smaller in diameter to the total number of said nitrides being less than 10% recited in claim 10. Because nitride limitations of prior art and present invention are overlapping, then a prima facie case of obviousness is established because it would be obvious for one skilled in the art to select the claimed ranges over the broader disclosure of the prior art since the prior art teaches the same utility and properties, see MPEP 2144.05.

Thus, as stated by the Examiner, JP '934 discloses a range for the diameter of nitrides of 0.005 to 0.5  $\mu\text{m}$ , which overlaps the presently claimed range of 0.02 to 0.50  $\mu\text{m}$ . The Examiner then improperly equates the 10 percent of nitrides in that range having a diameter of not more than 0.010  $\mu\text{m}$  with the presently claimed 10 percent of nitrides having a

diameter of 0.050  $\mu\text{m}$  or smaller. One of ordinary skill in the art will understand that the particle size distribution of the nitrides disclosed by JP '934 typically will be significantly different from the particle size distribution of the nitrides in the presently claimed steel plate, such that the steel disclosed in JP '934 provides no reason for one of ordinary skill in the art to make and/or use the presently claimed steel plate.

JP '934 does not disclose or suggest the presently claimed 10 percent of nitrides having a diameter of 0.050  $\mu\text{m}$  or smaller, and fails to provide any reason for one of ordinary skill in the art to combine and/or modify the teachings of the cited prior art references to obtain the claimed invention. One of ordinary skill in the art, following the teachings of the cited references would not have a reasonable expectation of success of obtaining the presently claimed steel plate without resort to hindsight, based on the disclosure of the present specification.

The Examiner has taken a position that requires the presently claimed 10 percent of nitrides having a diameter of 0.050  $\mu\text{m}$  or smaller to be inherent to the disclosure of a steel having 10 percent of nitrides having a diameter of not more than 0.010  $\mu\text{m}$  in JP '934. However, the recitations of the present claims are not a necessary result of the disclosure of JP '934, and, thus, are not inherently disclosed.

It should be clear to one of ordinary skill in the art that no more than 10 percent having diameters of 0.050  $\mu\text{m}$  or less, as presently claimed, is not equivalent to or obvious over 10 percent having diameters of 0.010  $\mu\text{m}$  or less, as disclosed by JP '934.

A diameter of 0.050  $\mu\text{m}$  is five (5) times greater than a diameter of 0.010  $\mu\text{m}$ . One of ordinary skill in the art will understand that a steel in which 10 percent of the nitrides have a diameter of no more than 0.010  $\mu\text{m}$  is within the scope of the disclosure of JP '934. One of ordinary skill in the art will also understand that such a steel will not be a steel in which no more than 10 percent of the nitrides have a diameter of no more than 0.050  $\mu\text{m}$ , as presently claimed, unless the steel contains no nitrides between 0.010 and 0.050  $\mu\text{m}$ . Otherwise, the portion of nitrides having a diameter of no more than 0.050  $\mu\text{m}$  will be significantly greater than 10 percent. One of ordinary skill in the art will also understand that the portion of nitrides having a diameter of no more than 0.050  $\mu\text{m}$  will remain significantly greater than 10 percent as the portion of nitrides having a diameter of no more than 0.010  $\mu\text{m}$  is decreased from 10 percent. Thus, the presently claimed steel plate is clearly not a necessary result of the disclosure of JP '934.

A steel in which no more than 10 percent of the nitrides have a diameter of no more than 0.050  $\mu\text{m}$ , as presently claimed, will, by definition, have no more than 10 percent of the nitrides having a diameter of no more than 0.010  $\mu\text{m}$ . However, that fact cannot render the present claims obvious.

Moreover, the reverse is not necessarily true. A steel in which no more than 10 percent of the nitrides have a diameter of no more than 0.010  $\mu\text{m}$ , as disclosed by JP '934, will not necessarily have no more than 10 percent of the nitrides having a diameter of no more than 0.050  $\mu\text{m}$ , as presently claimed. As noted above, where the portion of nitrides having a diameter of 0.010  $\mu\text{m}$  is equal to 10 percent, the number of nitrides having diameters of 0.050  $\mu\text{m}$  or less must be significantly greater than 10 percent.

As will be understood by one of ordinary skill in the art, in a steel, having a distribution of particle sizes in which no more than 10 percent of the nitrides have a diameter of 0.050  $\mu\text{m}$ , the portion of nitrides having a diameter of less than 0.010  $\mu\text{m}$  will be significantly less than 10 percent. As the portion of portion of nitrides having a diameter of less than 0.010  $\mu\text{m}$  increases, the number of nitrides having a diameter of 0.010 to 0.050 must decrease. Thus, the possibility of the steel having no more than 10 percent of the nitrides having a diameter of 0.050  $\mu\text{m}$  rapidly decreases as the portion of nitrides having a diameter of less than 0.010  $\mu\text{m}$  increases to 10 percent.

Therefore, a steel in which the portion of nitrides having a diameter of no more than 0.050  $\mu\text{m}$  is no more than 10 percent is not a necessary result of a steel in which the portion of nitrides having a diameter of no more than 0.010  $\mu\text{m}$  is no more than 10 percent. It is doubtful that one of ordinary skill in the art, following the disclosure of JP '934 would obtain a steel in which the portion of nitrides having a diameter of no more than 0.050  $\mu\text{m}$  is no more than 10 percent, as presently claimed, and, thus, the presently claimed steel plate is not a necessary result of the disclosure of JP '934.

Therefore, JP '934 does not disclose or suggest all of the elements recited in the present claims.

The abstracts of JP '289 and JP '686 are cited for the disclosure of nickel plating the steel. However, those documents do not disclose or suggest steel in which the portion of nitrides having a diameter of no more than 0.050  $\mu\text{m}$  is no more than 10 percent, as presently claimed. Therefore, JP '934, JP '289, and JP '686, whether taken alone or in combination, do not disclose or suggest all of the elements of the presently claimed steel plate recited in the



present claims. Accordingly, the cited references, whether taken alone or in combination, fail to provide a *prima facie* case of obviousness, and the present claims are not obvious over the cited references.

With regard to the obviousness type double patenting rejection of claims 10 and 11 over claims 1 to 3 of Murakami, as stated above, Murakami issued from the U.S. national stage filing of the PCT application corresponding to JP ‘934. As the disclosure of Murakami is substantially the same as that of JP ‘934, the present claims are not obvious over Murakami for the reasons set forth above with regard to JP ‘934. That is, Murakami, whether taken alone or in combination with JP ‘289 and JP ‘686, does not disclose all of the elements recited in the present claims, and the combination of the cited references fails to provide a *prima facie* case of obviousness, such that the present claims are not obvious.

#### **8. Claims Appendix**

A “Claims Appendix” is attached hereto, and appears on the two (2) pages numbered “Claims Appendix 1” and to “Claims Appendix 2.”

#### **9. Evidence Appendix**

No evidence has been submitted pursuant to 37 C.F.R. §§ 1.130 or 1.131. Evidence has been submitted pursuant to 37 C.F.R. § 1.132:

An Evidence Appendix, containing a Declaration of Hidekuni Murakami pursuant to 37 C.F.R. § 1.132, filed with a Response dated July 11, 2008, is attached, and is set forth on the one (1) page numbered “Evidence Appendix 1.”

#### **10. Related Proceedings Appendix**

As indicated in Section 2, above, “[t]here are no other prior or pending appeals, interferences, or judicial proceedings known by the undersigned, or believed by the undersigned to be known to Appellants or the Assignee, Nippon Steel Corporation, ‘which may be related to, directly affect or be directly affected by or have a bearing on the Board’s decision in the pending appeal.’” As such, there are no “decisions rendered by a court or the Board in any proceeding identified pursuant to [37 C.F.R. § 41.37(c)(1)(ii)]” to be submitted. A “Related Proceedings Appendix” is nevertheless attached hereto and appears on the one (1) page entitled “Related Proceedings Appendix.”

## 11. Conclusion

For the reasons set forth above, Appellants respectfully submit that the cited references, whether taken alone or in combination, do not disclose or suggest all the elements recited in the present claims. Therefore, the cited references do not provide a *prima facie* case of obviousness. Accordingly, it is respectfully submitted that the subject matter set forth in the claims of the present application is patentable.

In view of the foregoing, Appellants respectfully request reversal of all of the rejections set forth in the Final Office Action.

Respectfully submitted,

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## **CLAIMS APPENDIX**

Claims 1 to 6 (Canceled)

7. (Withdrawn) A method for producing a steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties and enameling properties characterized by:

retaining a slab containing the components according to claim 10, in the temperature range from 900 to 1,100°C (Retained Temperature Range 1) for 300 minutes or longer before commencing hot rolling;

thereafter retaining it in a temperature range not less than 50°C higher than said retained temperature (Retained Temperature 2) for 10 to 30 minutes;

then cooling it to a temperature range not less than 50°C lower than said retained temperature (Retained Temperature 3) at a cooling rate of 2°C/sec. or less;

retaining it in said retained Temperature 3 for 10 minutes or longer; and thereafter commencing hot rolling.

8. (Withdrawn) A method for producing a steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties and enameling properties according to claim 7, wherein hot-rolling is controlled under the condition of the time period from the time when the coiling of a hot-rolled steel sheet terminates at a temperature of 700 to 750°C in a hot-rolling process to the time when the temperature of said steel sheet reaches 550°C or lower for 20 minutes or longer.

9. (Withdrawn) A method for producing a steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties and enameling properties according to claim 7, wherein the hot-rolled steel sheet is retained in the temperature range from 900 to 1,200°C for 2 minutes or longer with the temperature of said steel sheet not lowered to 900°C or lower when the reduction ratio reaches 50% or more after commencing hot-rolling, and thereafter hot-rolling is commenced again.

10. (Previously Presented) A steel sheet for vitreous enameling excellent in workability, aging properties and enameling properties, the steel sheet comprising:

no more than 0.0025 mass percent carbon;

no more than 0.010 mass percent silicon;

from 0.1 to 0.5 mass percent manganese;

0.0005 to 0.0033 mass percent nitrogen;

from 0.60 times the amount of nitrogen to 0.0060 mass percent boron;  
from 10 times the difference between the amount of boron and  $1\frac{1}{14}$  times the amount of nitrogen,  $10 \times (B - 1\frac{1}{14} \times N)$ , to 0.030 mass percent phosphorous;  
no more than 0.030 mass percent sulfur;  
no more than 0.010 mass percent aluminum;  
0.005 to 0.0450 mass percent oxygen; and  
a balance of Fe and unavoidable impurities, wherein  
the steel sheet contains simple or compound nitrides, having a diameter of 0.02 to 0.50  $\mu\text{m}$ , containing boron or aluminum, and having an average diameter of at least 0.080  $\mu\text{m}$ , and  
the proportion of the number of the nitrides of 0.050  $\mu\text{m}$  or smaller in diameter to the total number of the nitrides is 10 percent or less, wherein the ratio of the amount of nitrogen in the steel sheet existing as boron nitride, BN, to the amount of nitrogen in the steel sheet existing as aluminum nitride AlN,  
 $(\text{the amount of N existing as BN})/(\text{the amount of N existing as AlN})$ , is  $\geq 10.0$ ; and  
the steel sheet comprises nickel plating on the steel sheet in an amount of about 0.01 to 2  $\text{g}/\text{m}^2$ .

11. (Previously Presented) The steel sheet for vitreous enameling according to claim 10, wherein the steel sheet further comprises one or more of niobium, vanadium, titanium, nickel, chromium, selenium, arsenic, tantalum, tungsten, molybdenum, and tin, each in an amount of no more than 0.030 mass percent.

## **Evidence Appendix**

Declaration under 37 C.F.R. §1.132 of Hidekuni Murakami.

### **Related Proceedings Appendix**

As indicated in Sections 2 and 10, above, “[t]here are no other prior or pending appeals, interferences, or judicial proceedings known by the undersigned, or believed by the undersigned to be known to Appellants or the Assignee, Nippon Steel Corporation, ‘which may be related to, directly affect or be directly affected by or have a bearing on the Board’s decision in the pending appeal.’” As such, there no “decisions rendered by a court or the Board in any proceeding identified pursuant to [37 C.F.R. § 41.37(c)(1)(ii)]” to be submitted.